

# Section 7: Hazardous Materials

Hazardous materials pose a risk to health, safety, and property during transportation. The Hazardous Materials Table lists these materials. The rules sometimes require diamond shaped warning signs on vehicles with hazardous materials. These signs are called placards.

You must have a commercial driver's license with a hazardous materials endorsement before driving vehicles with placards. To get the endorsement you must pass a written test about the hazardous materials transportation rules. Section 7 explains these rules. By studying this section you will learn to recognize hazardous cargo, and to communicate the danger.

Everything you need to know to pass the written test is in this manual. However, this is only a beginning. Most drivers need to know much more on the job. You can learn more by reading the rules in State and Federal Regulations. You can also learn more by attending training courses offered by your employer or others. Government and industry publishers sell copies of the rules. Union or company offices often have copies of the rules for driver use. Find out where you can get your own copy to use on the job.

Drivers must have special training before they transport flammable cryogenic liquids or highway route controlled quantities of radioactive material. Each driver's employer provides the training. The driver carries a dated certificate of training signed by the employer. Drivers must have had training within the last two years.

Some locations require permits to transport Explosives A & B, or bulk hazardous waste. States and counties may also require drivers to follow special routes. The Federal government may require permits for special hazardous materials cargo (eg., rocket fuel). Find out about permits and special routes for places you drive.

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Many hazardous materials can injure or kill people. To protect drivers and others, the rules tell shippers how to package safely. Similar rules tell drivers how to load, transport, and unload bulk tanks. These are containment rules.

Shippers must warn drivers and others about a material's hazardous qualities. They put warning labels on packages and describe materials in a way that clearly warns of the risk. There are rules for drivers too. They must warn others if there is an accident or a leak. Placards are another way to communicate the risk.

## **This Section Covers**

- ***The Intent of the Regulations***
- ***Driver Responsibilities***
- ***Communication Rules***
- ***Loading & Unloading***
- ***Bulk Tank Loading, Unloading, and Marking***
- ***Driving and Parking Rules***
- ***Emergencies***

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## **7.1 The Intent of the Regulations**

- ***Contain the Material***
- ***Communicate the Risk***

## **Assure Safe Drivers and Equipment**

Drivers must pass a written test about transporting hazardous materials. To pass the test, you must know how to

- recognize shipments of hazardous materials
- safely load shipments
- correctly placard your vehicle
- safely transport shipments.

Learn the rules and follow them. Following the rules reduces the risk of injury from hazardous materials. Taking shortcuts by breaking rules is unsafe. Rule breakers can be fined and put in jail.

Inspect your vehicle before and during each trip. Law enforcement officers may stop and inspect your vehicle. They can also check your shipping papers. They will look for a hazardous materials endorsement on your driver's license.

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## **7.2 Hazardous Materials Transportation -- Who Does What?**

### ***The Shipper***

#### **The shipper:**

- sends products from one place to another by truck, railroad, ship, or airplane
- uses the hazardous materials regulations to decide the product's
  - proper shipping name
  - hazard class
  - identification number
  - correct packaging
  - correct label and markings
  - correct placard
- packages the materials, labels and marks the package, prepares the shipping paper, supplies placards
- certifies on the shipping paper that he has prepared the shipment according to the rules (Unless you are pulling cargo tanks supplied by you or your employer.)

### ***The Carrier***

#### **The carrier:**

- takes the shipment from the shipper to its destination
- checks that the shipper correctly named, labeled and marked the shipment
- refuses improper shipments
- reports accidents and incidents involving hazardous materials to the proper government agency

### ***The Driver***

#### **The driver:**

- makes sure the shipper has identified, marked, and labeled the product
- refuses leaking shipments
- placards his vehicle when loading, if needed
- safely transports the shipment without delay
- follows all special rules about transporting hazardous material
- keeps hazardous material shipping papers in the proper place

Some words and phrases have special meanings when talking about hazardous materials. The meanings may differ from common use. The words and phrases in this section may be on your test. The meanings of other important words are in the glossary at the end of Section 7.

## 7.3 Communication Rules

### Definitions

A material's **hazard class** reflects the risks associated with it. There are 22 different hazard classes. Appendix B tells the exact meaning of each hazard class.

Blasting Agent	Non-Flammable Gas
Combustible Liquid	Organic Peroxide
Corrosive Material	ORM-A
Etiologic Agents	ORM-B
Explosive A	ORM-C
Explosive B	ORM-D
Explosive C	ORM-E
Flammable Liquid	Oxidizer
Flammable Gas	Poison A
Flammable Solid	Poison B
Irritating Material	Radioactive Material

The **shipping paper** describes a shipment of hazardous material. Each item description on the shipping paper shows the material's hazard class. Shipping orders, bills of lading, and manifests are all shipping papers. Figure 7-5 shows an example shipping paper.

After an accident or hazardous material leak, you may be unable to speak. Fire fighters and police can prevent more damage or injury if they know the hazards involved. Your life, and the lives of others, may depend on their quickly finding the shipping papers for hazardous cargo. For that reason the rules

- require shippers to describe shipments correctly on shipping papers
- require carriers and drivers to put tabs on shipping papers related to hazardous materials, or keep them on top of other shipping papers
- require drivers to keep shipping papers for hazardous cargo
  - in a pouch on the driver's door, or
  - in clear view within reach while driving, or
  - on the driver's seat when out of the vehicle.

Shippers put diamond shaped labels on hazardous material packages. These labels warn others of the hazard. If the diamond label won't fit on the package, shippers put the label on a tag. For example, compressed gas cylinders that will not hold a label will have tags or decals. Labels look like the example in Figure 7-1. A chart showing all the labels is at the back of this manual.

### Package Labels

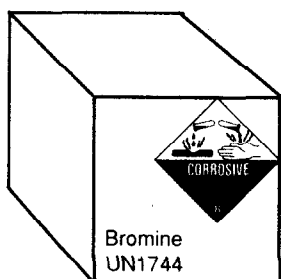


Figure 7-1  
Example of Labeled Package

**Placards** are used to warn others of hazardous cargo. Placards are signs put on the outside of a vehicle to show the hazard class of the cargo. A placarded vehicle must have at least 4 identical placards. They are put on the front, rear, and both sides (see Figure 7-2). Placards must be readable from all four directions. There are 19 DOT specification placards. They are 10 3/4 inches square, turned upright on a point, in a diamond shape. Cargo tanks show the I.D. number of their contents on placards or orange panels.

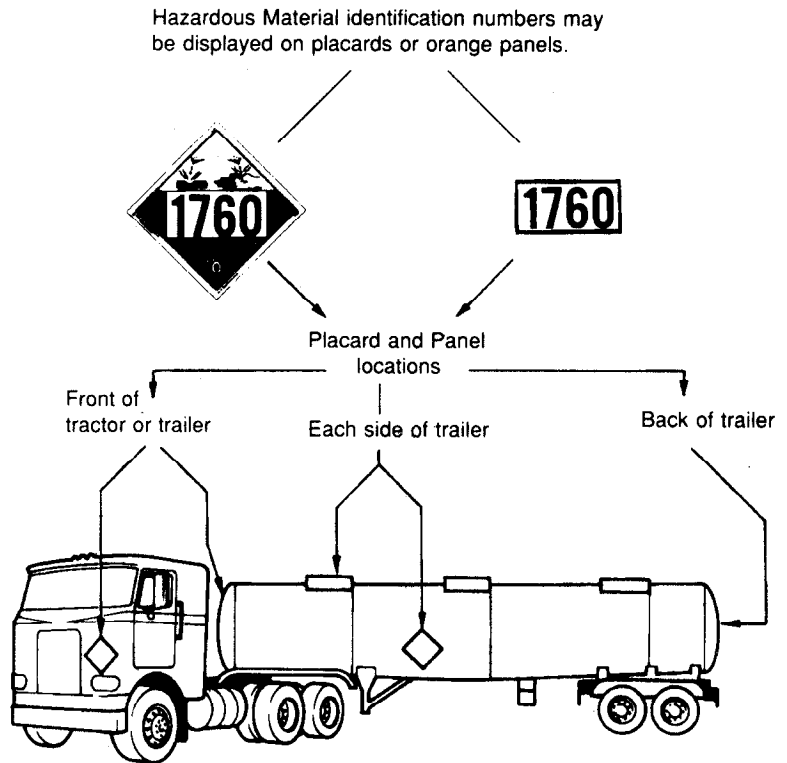


Figure 7-2  
Placard and Panel Locations

### • ***Lists of Regulated Products***

There are two main lists used by shippers, carriers, and drivers. Before transporting an unfamiliar product, look for its name on both lists. Some products are on both lists, others may be on only one. Always check both

- the Hazardous Materials Table, and
- the List of Hazardous Substances and Reportable Quantities.

**The Hazardous Materials Table.** Figure 7-3 shows a part of the Hazardous Materials Table. Column 1 tells which shipping mode the entry affects. The next four columns show each material's shipping name, hazard class, ID number, and required labels.

Three different symbols can show in Column 1 of the table.

- + shows the shipping name and hazard class to use, even if the product doesn't match the hazard class definition.
- A means the entry applies only to air shipments that are not a hazardous substance or hazardous waste.
- w means the entry applies only to water shipments that are not a hazardous substance or hazardous waste.

Column 2 shows the names of regulated materials. Entries are in alphabetical order so you can more easily find the right entry. Use the name of the material from the shipping paper. The table shows proper shipping names in regular type. The shipping paper must show proper shipping names. Names shown in *italics* are not proper shipping names. A shipper may only use the names shown in italics in addition to the proper shipping name.

Column 3 shows each material's hazard class or the word "Forbidden." Never transport a material that is "Forbidden." A material's hazard class is the key to using placards. You can decide which placards to use if you know these three things.

- material's hazard class
- amount being shipped
- amount of all hazardous materials of all classes on your vehicle.

Column 3a shows each material's identification number. The identification number must appear on the shipping paper and package. It also must appear on cargo tanks. Police and fire crews use the number to quickly identify the material after an accident.

Column 4 shows the label shippers put on packages of hazardous material. Some products need more than one label. No label is needed where the table shows the word NONE. You can read more about labels later in this section.

The letters A and W in column 1 mean that this product is only regulated if shipped by Air or Water, unless the material is a hazardous substance or hazardous waste. If it is a hazardous substance or hazardous waste it is regulated if it is shipped by truck.

The (+) sets the shipping name and hazard class.

Column 4 shows the label placed on packages. Some hazardous materials require more than one label

(1) +/ A/ W	(2) Hazardous Materials Descriptions and Proper shipping names	(3) Hazard class	(3A) Identification number	(4) Label(s) required
	Carbolic acid, liquid ( <i>liquid tar acid</i> containing over 50% phenol). See Phenol, liquid			
	Carbon bisulfide, or Carbon disulfide	Flammable liquid	UN1131	Flammable liquid
	Carbon dioxide	Nonflammable gas	UN1013	<del>Nonflammable</del> gas
	Carbon dioxide-nitrous oxide mixture	Nonflammable gas	UN1015	Nonflammable gas
	Carbon dioxide-oxygen mixture	Nonflammable gas	UN1014	Nonflammable gas
	Carbon dioxide, refrigerated liquid	Nonflammable gas	UN2187	Nonflammable gas
AW	Carbon dioxide, solid, or Dry ice, or Carbonice	ORM-A	UN1845	None
(+)	Carbon monoxide	Flammable gas	UN1016	Flammable gas
	Carbon monoxide, cryogenic liquid	Flammable gas	NA9202	Flammable gas
AW	Carbon tetrachloride <i>Carbonyl chloride. See Phosgene</i>	ORM-A	UN1846	None

Figure 7-3  
Part of the  
Hazardous Materials Table

### The List of Hazardous Substances and Reportable Quantities.

The DOT and the EPA want to know about spills of some products. These products are called **hazardous substances**. They are named in the List of Hazardous Substances and Reportable Quantities (see Figure 7-4). Column 3 of the list shows each product's reportable quantity (RQ). The shipper identifies RQs on the shipping paper. The letters RQ may appear before or after the basic item description. You or your employer must report any spill of a **reportable quantity** of these substances.

Starred\* entries also occur in the Hazardous Materials Table. Look at the entry for Phosgene in column 1 of Figure 7-4. The star\* shows that the Hazardous Materials Table also lists phosgene. Column 2 shows that Carbonyl Chloride is another name for the same product. The RQ for phosgene is 10 pounds. If there are 10 pounds or more in a single package, the shipment contains a reportable quantity. The item description on the shipping paper will include the letters RQ. This tells drivers that their employer must report spills of the shipment to the National Response Center. More information about the reporting rules appears later in this section. Figure 7-5 on the next page shows a correct shipping paper for Phosgene with all the entries required by regulation.

If the words INHALATION HAZARD are on the shipping paper or package, the rules require POISON placards. You must use POISON placards in addition to any others needed by the product's hazard class. Always show the hazard class placard and the POISON placard, even for small amounts.

#### Test Your Knowledge

1. Shippers package in order to (fill in the blank) the material.
2. Drivers placard their vehicle to (fill in the blank) the risk.
3. What three things do you need to know to decide which placards (if any) you need?
4. A hazardous material's ID number must appear on the (fill in the blank) and on the (fill in the blank). The number must also appear on cargo tanks.
5. Where must you keep shipping papers describing hazardous materials?

These questions may be on your test. If you can't answer all, reread pages 7-1 through 7-6.

**Figure 7-4**  
Part of the List of Hazardous Substances and Reportable Quantities

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES - Continued		
Hazardous Substance	Synonyms	Reportable Quantity (RQ) Pounds (Kilograms)*
Phenyl mercaptan @	Benzinethiol	100 (45.4)
	Thiophenol *	
Phenylmercuric acetate	Mercury, (acetato-0)phenyl	100 (45.4)
N-Phenylthiourea	Thiourea, phenyl	100 (45.4)
Phorate	Phosphorodithioic acid, 0,0-diethyl S-(ethylthio), methylester	10 (4.54)
Phosgene *	Carbonyl chloride	10 (4.54)
Phosphine *	Hydrogen phosphide	100 (45.4)
Phosphoric acid *		5000 (2270)
Phosphoric acid, diethyl p-nitrophenyl ester	Diethyl-p-nitrophenyl phosphate	100 (45.4)
Phosphoric acid, lead salt	Lead phosphate	1 (0.454)

The name Phosgene is starred (\*) because the name also appears in the hazardous materials table

Spills of 10 pounds or more must be reported

The shipping paper shown in Figure 7-5 describes a shipment. The shipping paper for a hazardous material must include

- page numbers if the shipping paper has more than one page. The first page must tell the total number of pages. For example, "Page 1 of 4."
- a proper description of the hazardous product.
- a **"shipper's certification,"** signed by the shipper, saying he/ she prepared the shipment according to the regulations.

If the shipping paper describes both hazardous and non-hazardous products, the hazardous materials will be either

- described first, or
- highlighted in a contrasting color, or
- identified by an "X" placed before the shipping name in a column captioned "HM." The letters "RQ" may be used instead of "X" if the shipment is a reportable quantity.

The basic description of a hazardous product includes the proper shipping name, hazard class, and identification number, in that order.

Shipping name, hazard class, and ID number must not be abbreviated. The description must also show

- the total quantity and unit of measure, and
- the letters RQ if a reportable quantity.

## • The Shipping Paper

## • The Item Description

"RQ" means that this is a reportable quantity

Proper shipping name from Column 2 of the Hazardous Materials Table

Hazard Class from Column 3 of the Table

ID Number from the Hazardous Materials Table

SHIPPING PAPER			
Page 1 of 1			
TO: Wafers R Us 88 Valley Street Silicon Junction, CA		FROM: Essex Corporation 5775 Dawson Avenue Goleta, CA 93117	
QTY	HM	DESCRIPTION	WEIGHT
1 cyl	RQ	Phosgene, Poison A, UN1076	25 lbs
<p>This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.</p> <p>Shipper: Essex Corp                      Carrier: Knuckle Bros.  Per: Shultz                                      Per:  Date: 6/27/88                                      Date:</p>			

Figure 7-5  
Example of a Shipping Paper

Total quantity can appear before or after the basic description. Packaging type and the unit of measurement may be abbreviated. For example:

10 ctns. Paint, Flammable liquid, UN1263, 500 lbs.

The shipper of hazardous waste must put the word WASTE before the name of the material on the shipping paper (hazardous waste manifest). For example:

Waste Acetone, flammable liquid, UN1090.

A non-hazardous material may **not** be described by using a hazard class or an ID number.

### **Shipper's Certification**

When the shipper packages a hazardous material, he certifies that the package has been prepared according to the regulations. The signed shipper's certification appears on the original shipping paper. The only exceptions are when a shipper is a private carrier transporting his or her own product, and when the package is provided by the carrier (for example, a cargo tank). The glossary at the back of this manual shows acceptable shipper certifications. Unless a package is clearly unsafe, you may accept the shipper's certification concerning proper packaging. Some carriers have additional rules about transporting hazardous products. Follow your employer's rules when accepting shipments.

### **Package Markings and Labels**

Shippers print required markings directly on the package, an attached label, or tag. The most important package marking is the name of the hazardous material. It is the same name as the one on the shipping paper. When required, the shipper will put the following on the package:

- the name and address of shipper or consignee,
- the hazardous material's shipping name and identification number,
- the labels required.

If the rules require it, the shipper also will put RQ or INHALATION-HAZARD on the package. Cartons with liquid containers inside may also have "this side up" markings. The labels used always reflect the hazard class of the product. If a package needs more than one label, the labels will be close together, near the proper shipping name.

### **Recognizing Hazardous Materials**

Learn to recognize shipments of hazardous materials. To find out if the shipment includes a hazardous material, look at the shipping paper. Does it have

- an entry with a proper shipping name, hazard class, and ID number?
- a highlighted entry, or one with an X or RQ in the HM column?

Other clues suggest hazardous materials

- What business is the shipper in? Paint dealer? Chemical supply? Scientific supply house? Pest control or agricultural supplier? Explosives, munitions, or fireworks dealer?
- Are there tanks with diamond labels or placards on the premises?
- What type of package is being shipped? Cylinders & drums are often used for hazardous material shipments.
- Does the package bear a hazard class label, proper shipping name, or ID number?
- Are there any handling precautions?



When transporting a hazardous waste, you must sign and carry a Uniform Hazardous Waste Manifest. The name and EPA registration number of the shipper, carriers, and destination must appear on the manifest. The shipper will prepare, date and sign the manifest. Treat the manifest as a shipping paper when transporting the waste. Only give the waste shipment to another registered carrier or treatment facility. Each carrier transporting the shipment must sign the manifest. After you deliver the shipment, keep your copy of the manifest. Each copy must have all needed signatures and dates, including those of the person to whom you delivered the waste.

## **Hazardous Waste Manifest**

Attach the right placards as you load the vehicle and before you drive it. You may move an improperly placarded vehicle only in an emergency to protect life or property.

## **Placarding**

Placards must appear on both sides and ends of the vehicle. Each placard must be

- easily seen from the direction it faces
- placed so the words or numbers are level and read from left to right
- at least 3 inches away from any other markings.

First check that the shipper is using the correct hazard class for the shipping paper and package label. If you are not familiar with the material, ask the shipper or contact your office. To decide which placards to use, you need to know

- the shipment's hazard class,
- the amount shipped,
- and the total weight of all hazardous materials in your vehicle.

There are two placard tables. Always use placards to transport **any** amount of material in Table 1.

**PLACARD TABLE 1**

IF YOUR VEHICLE CONTAINS ANY AMOUNT OF...	PLACARD AS...
Class A explosives .....	EXPLOSIVE A
Class B explosives .....	EXPLOSIVE B
(not required if placarded Explosive A)	
Poison A .....	POISON GAS
Flammable solid- .....	FLAMMABLE SOLID W.
(when labeled dangerous when wet)	
Radioactive material .....	RADIOACTIVE
(YELLOW III label only)	

## **Placard Table 1 -- Any Amount**

The hazard classes in Table 2 need placards only if the amount transported is 1000 lbs or more including the package. Add the amounts from all shipping papers for all the Table 2 products you have on board. You may use DANGEROUS placards instead of separate placards for each Table 2 hazard class when

- you have two or more Table 2 hazard classes, requiring different placards that total 1000 lbs or more, and
- you have **not** loaded 5000 lbs or more of any Table 2 hazard class material at any one place. (You must use the specific placard for this material.)
- If the words INHALATION HAZARD are on the shipping paper or package, the rules require POISON placards. You must use POISON placards in addition to any others needed by the product's hazard class. Always show the hazard class placard and the POISON placard, even for small amounts.

BLASTING AGENTS, OXIDIZER, and DANGEROUS placards need not be used if a vehicle contains Class A or Class B explosives and is placarded EXPLOSIVES A or EXPLOSIVES B. A NON-FLAMMABLE GAS placard is not needed on a vehicle displaying a FLAMMABLE GAS or an OXYGEN placard.

## PLACARD TABLE 2

IF YOUR VEHICLE CONTAINS 1000 LBS OR MORE...	PLACARD AS...
Class C explosives (with EXPLOSIVE C label)	DANGEROUS
Blasting Agents .....	BLASTING AGENTS
Nonflammable gas .....	NONFLAMMABLE GAS
Nonflammable gas (Flourine) .....	POISON
Nonflammable gas (cryogenic liquid oxygen)	OXYGEN
Flammable Gas .....	FLAMMABLE GAS
Flammable liquid .....	FLAMMABLE
Flammable solid .....	FLAMMABLE SOLID
Oxidizer .....	OXIDIZER
Organic Peroxide .....	ORGANIC PEROXIDE
Poison B .....	POISON
Corrosive material .....	CORROSIVE
Irritating material .....	DANGEROUS
Chlorine in container with capacity of 110 gal. or more .....	CHLORINE
Combustible liquid in container with capacity of 110 gal. or more .....	COMBUSTIBLE

**Placard Table 2 --  
1000 lbs. or more**

### Test Your Knowledge

1. What is a shipper's certification? Where does it appear? Who signs it?
2. When may non-hazardous material be described by hazard class words or ID number?
3. Name five hazard classes that require placarding in **any** amount.
4. A shipment described on the a Hazardous Waste Manifest may only be delived to another (fill in the blank) carrier or treatment facility, which then signs the (fill in the blank), giving you a copy which you must keep.
5. Your load includes 20 lbs of poison A and 1000 lbs flammable gas. What placards do you need, if any?

These questions may be on your test. If you can't answer all, reread pages 7-7 through 7-10.

- Do all you can to protect containers of hazardous materials. Don't use any tools which might damage containers or other packaging during loading. Don't use hooks.
- Before loading or unloading, set the parking brake. Make sure the vehicle will not move.
- Many products are more hazardous in the heat. Load hazardous materials away from heat sources.
- Watch for signs of leaking or damaged containers: **LEAKS SPELL TROUBLE!** Do not transport leaking packages. Depending on the material, you, your truck, and others could be in danger.

## 7.4 Loading & Unloading

### General Loading Requirements

**No Smoking.** When loading hazardous materials, keep fire away. Don't let people smoke nearby. Never smoke around

EXPLOSIVES

OXIDIZERS

FLAMMABLES

**Secure Against Movement.** Make sure containers don't move around in transit. Brace them so they will not fall, slide, or bounce around. Be very careful when loading containers that have valves or other fittings.

Do not open any package between the points of origin and destination. Never transfer hazardous products from one package to another. You may empty a cargo tank, but do not empty any other package while it is on the vehicle.

**Cargo Heater Rules.** There are special cargo heater rules for loading:

EXPLOSIVES

FLAMMABLE LIQUID

FLAMMABLE GAS

The rules usually forbid use of cargo heaters, including automatic cargo heater / air conditioner units. Unless you have read all the related rules, don't load the above products in a cargo space that has a heater.

**Use closed cargo space.** You cannot have overhang or tailgate loads of

EXPLOSIVES

FLAMMABLE SOLIDS

OXIDIZING MATERIALS

You must load these hazards into a closed cargo space unless all packages are

- fire and water resistant, or
- covered with a fire and water resistant tarp.

**Explosives.** Before loading or unloading any explosive, turn your engine off. Then check the cargo space.

- You must disable cargo heaters. Disconnect heater power sources and drain heater fuel tanks.
- There must be no sharp points that might damage cargo. Look for bolts, screws, nails, broken side panels, and broken floor boards.
- Use a floor lining with Class A or B explosives. The floors must be tight and the liner must not contain steel or iron.

### Precautions for Specific Hazards

Use extra care to protect explosives. Never use hooks or other metal tools. Never drop, throw, or roll the shipment. Protect explosive packages from other cargo that might cause damage.

Do not transfer a Class A or B explosive from one vehicle to another on a public roadway except in emergency. If safety requires an emergency transfer, set out red warning reflectors, flags, or electric lanterns. You must warn other highway users.

Never transport damaged packages of explosives. Do not take a package that shows any dampness or oily stain.

Do not transport EXPLOSIVES A in triples. Do not transport EXPLOSIVES A in vehicle combinations if

- there is a placarded cargo tank in the combination, or
- the other vehicle in the combination contains:
  - initiating explosives
  - radioactive materials labeled "Yellow III,"
  - class A or B poisons
  - hazardous materials in a portable tank, Spec 106A or 110A tank.

**Corrosive Liquids.** If loading by hand, load breakable containers of corrosive liquid one by one. Keep them right side up. Do not drop or roll the containers. Load them onto an even floor surface. Only stack carboys if the lower tiers can bear the weight of the upper tiers safely.

Do not load nitric acid above any other product, or stack more than two high.

Load charged storage batteries so their liquid won't spill. Keep them right side up. Make sure other cargo won't fall against or short circuit them.

Never load corrosive liquids next to or above

- EXPLOSIVES A
- EXPLOSIVES B
- FLAMMABLE SOLID
- OXIDIZING MATERIAL

**Compressed Gases, Including Cryogenic Liquids.** If your vehicle doesn't have racks to hold cylinders, the cargo space floor must be flat. The cylinders must be

- held upright or braced laying down flat, or
- in racks attached to the vehicle, or
- in boxes that will keep them from turning over.

**Poisons.** Never transport Poison A or irritating materials in containers with interconnections. Never load a package labeled POISON, POISON GAS, or IRRITANT, in the driver's cab or sleeper or with food material for human or animal consumption.

**Radioactive Materials.** Some packages of radioactive materials bear a number called the "transport index." The shipper labels these packages Radioactive II or Radioactive III, and prints the package's transport index on the label. Radiation surrounds each package, passing through all nearby packages. To deal with this problem, the number of packages you can load together is controlled. Their closeness to people, animals, and unexposed film is also controlled. The transport index tells the degree of control needed during transportation. The total transport index of all packages in a single vehicle must not exceed 50.

Appendix A has rules for each transport index. It shows how long and how close you can load radioactive products to people, animals, or film. For example, you can't leave a package with a transport index of 1.1 within 2 feet of people or cargo space walls.

**Mixed loads.** The rules require some products to be loaded separately. Do not load them together in the same cargo space. Figure 7-6 lists some examples. **The regulations (the Segregation and Separation Chart) name other materials you must keep apart.**

DO NOT LOAD...	IN THE SAME VEHICLE WITH...
POISON labeled material	animal or human food unless the poison package is overpacked in an approved way. Foodstuff is anything you swallow. However, mouthwash, toothpaste, and skin creams are not foodstuff.
Poison A	Oxidizers, Flammables, Corrosives, Organic Peroxides.
Charged storage batteries	Class A Explosives
Detonating primers	any other explosives unless in authorized containers or packagings.
Cyanides or cyanide mixtures	acids, corrosive materials, or other acidic materials which could release hydrocyanic acid from cyanides. Cyanides are materials with the letters CYAN as part of their shipping name. For example: Acetone <b>Cyanohydrin</b> Silver <b>Cyanide</b> Trichloroisocyanuric acid, dry
Nitric acid	Other corrosive liquids in carboys, unless separated from them in an approved way.

**Figure 7-6**  
Prohibited Loading  
Combinations

Test Your Knowledge
<ol style="list-style-type: none"> <li>1. Around which three hazard classes must you never smoke?</li> <li>2. Which three hazard classes should not be loaded into a trailer that has a heater / air conditioner unit?</li> <li>3. Should the floor liner required for Explosives A be stainless steel?</li> <li>4. At the shipper's dock you're given a shipping paper for 100 cartons of battery acid. You already have 100 lbs of dry Trichloroisocyanuric acid on board. What precautions do you take?</li> <li>5. Name a hazard class that uses a transport index. What is the maximum transport index that can be loaded in a single vehicle?</li> </ol>
These questions may be on your test. If you can't answer all, reread Section 7.4.

## 7.5 Bulk Tank Marking, Loading & Unloading

The glossary gives the special meaning of the word bulk. **Cargo tanks** are bulk containers permanently attached to a vehicle. Cargo tanks remain on the vehicle when you load and unload them. **Portable tanks** are bulk containers which are not permanently attached to a vehicle. They are loaded or unloaded with the product while off the vehicle. Portable tanks are then put on a vehicle for transportation. There are many types of cargo tanks in use. The most common are MC306 for liquids and MC331 for gases.

### *Tank Markings*

You must display the ID number of the contents of portable tanks and cargo tanks. Product ID numbers are in column 3a of the Hazardous Materials Table. The rules require black 4 inch numbers on orange panels, DOT placards, or a white, diamond shaped background if no placards are required. Specification cargo tanks must show retest date markings.

Portable tanks must also show the lessee or owner's name. They must also show the shipping name and ID number of the contents on two opposing sides. The letters must be at least 2 inches tall. The ID number must appear on each side **and** each end of tanks that hold 1000 gallons or more. The ID numbers must still show when the portable tank is on the vehicle. If they don't, you must display the ID number on both sides and ends of the vehicle.

### *Tank Loading*

The person in charge of loading and unloading a cargo tank must be sure someone is always watching. The person watching the loading or unloading must

- have a clear view of the cargo tank,
- be within 25 feet of the tank,
- be aware of the hazards,
- know the procedures to follow in an emergency, and
- be authorized to move the cargo tank and able to do so.

Close all manholes and valves before moving a tank of hazardous materials. It does not matter how small the amount in the tank or how short the distance. Manholes and valves must not leak.

### *Flammable Liquids*

Turn off your engine before loading or unloading any flammable liquid. Only run the engine if needed to operate a pump. Ground a cargo tank correctly before filling it through an open filling hole. Ground the tank before opening the filling hole, and maintain the ground until after closing the filling hole.

### *Compressed Gas*

Keep liquid discharge valves on a compressed gas tank closed except when loading and unloading. Unless your engine runs a pump for product transfer, turn it off when loading or unloading. If you use the engine, turn it off after product transfer, before unhooking the hose. Unhook all loading / unloading connections before coupling, uncoupling, or moving a chlorine cargo tank. Always chock trailers and semi-trailers to prevent motion when uncoupled from the power unit.

1. What are cargo tanks?
2. How is a portable tank different from a cargo tank?
3. Your engine runs a pump used during delivery of compressed gas. Should you turn off the engine **before** or **after** unhooking hoses after delivery?

These questions may be on your test. If you can't answer all, reread section 7.5.

Never park with EXPLOSIVES A or EXPLOSIVES B within 5 feet of the travelled part of the road. Unless your work requires it, do not park within 300 feet of

- a bridge, tunnel, or building,
- a place where people gather, or
- an open fire.

If you must park to do your job, do so only briefly.

Don't park on private property unless the owner is aware of the danger. Someone must always watch the parked vehicle. You may let someone else watch it for you only if your vehicle is

- on the shipper's property, or
- on the carrier's property, or
- on the consignee's property.

You can leave your vehicle unattended in a safe haven. A safe haven is a government approved place for parking unattended vehicles loaded with explosives.

You may park a placarded vehicle (not carrying explosives) within 5 feet of the travelled part of the road only if your work requires it. Do so only briefly. Someone must always watch the vehicle when parked on a public roadway or shoulder. Do not uncouple a trailer and leave it with hazardous material on a public street. Do not park within 300 feet of an open fire.

The person watching a placarded vehicle must

- be in the vehicle, awake, and not in the sleeper berth, or within 100 feet of the vehicle and have it within clear view,
- be aware of the hazards,
- know what to do in emergencies, and
- be able to move the vehicle if needed.

You might break down and have to use stopped vehicle signals. Use reflective triangles or red electric lights. Never use burning signals, such as flares or fusees, around a

- tank used for flammable liquid or flammable gas (whether loaded or empty),
- vehicle loaded with

EXPLOSIVES A	FLAMMABLE LIQUID
EXPLOSIVES B	FLAMMABLE GAS

Some states and counties require permits to transport hazardous material or waste. They may limit the routes you can use. Local rules about routes and permits change often. It is your job as driver to find out if you need permits or must use special routes. Make sure you have all needed papers before starting.

If you work for a carrier, ask your dispatcher about route limits or permits. If you are an independent and are planning a new route, check with state agencies where you plan to travel. Some localities prohibit transportation of hazardous materials through tunnels, over bridges, or other roadways. Check before you start.

## **7.6 Hazardous Materials: Driving & Parking Rules**

### ***• Parking with Explosives A***

### ***• Parking When Placarded but Not Transporting Explosives A or B***

### ***• Watching Parked Vehicles***

### ***• No Flares!***

### ***• Route Restrictions***

Whenever placarded, avoid heavily populated areas, crowds, tunnels, narrow streets, and alleys. Take other routes, even if inconvenient, unless there is no other way. Never drive a placarded vehicle near open fires unless you can safely pass without stopping.

If transporting Class A or Class B Explosives, you must have a written route plan and follow that plan. Carriers prepare the route plan in advance, and give the driver a copy. You may plan the route yourself if you pick up the explosives at a location other than your employer's terminal. Write out the plan in advance. Keep a copy of it with you while transporting the explosives. Deliver shipments of explosives only to authorized persons or leave them in locked rooms designed for explosives storage.

A carrier must choose the safest route to transport placarded radioactive material. After choosing the route, the carrier must tell the driver about the radioactive materials, and show the route to be taken.

- **No Smoking**

Do not smoke within 25 feet of a placarded tank used for flammable liquids or gases. Also do not smoke or carry a lighted cigarette, cigar, or pipe within 25 feet of any vehicle which contains

EXPLOSIVES

OXIDIZERS

FLAMMABLES

- **Refuel With Engine Off**

Turn off your engine before fueling a placarded vehicle. Someone must always be at the nozzle, controlling fuel flow.

- **10 B:C Fire Extinguisher**

The power unit of placarded vehicles must have a fire extinguisher with a UL rating of 10 B:C or more.

- **Check Tires  
Every 2 hours / 100 miles**

Make sure your tires are properly inflated. Check placarded vehicles with dual tires at the start of each trip and when you park. You must stop and check the tires every 2 hours or 100 miles, whichever is less. The only acceptable way to check tire pressure is to use a tire pressure gauge.

Do not drive with a tire that is leaking or flat except to the nearest safe place to fix it. Remove any overheated tire. Place it a safe distance from your vehicle. Don't drive until you correct the cause of the overheating. Remember to follow the rules about parking and watching placarded vehicles. They apply even when checking, repairing, or replacing tires.

- **Where to Keep  
Shipping Papers**

Do not take a hazardous material shipment without a properly prepared shipping paper. A shipping paper for hazardous material must always be easily recognized. Other people must be able to find it quickly after an accident.

- Clearly distinguish hazardous material shipping papers from others by tabbing them or keeping them on top of the stack of papers.
- When you are behind the wheel, keep shipping papers within your reach (with your seat belt on), or in a pouch on the driver's door. They must be easily seen by someone entering the cab.
- When not behind the wheel, leave shipping papers in the driver's door pouch or on the driver's seat.



A carrier must give each driver transporting Class A or Class B explosives a copy of FMCSR part 397. The carrier must also give written instructions on what to do if delayed or in an accident. The written instructions must include

- the names and telephone numbers of people to contact (including carrier agents or shippers),
- the nature of the explosives transported,
- the precautions to take in emergencies such as fires, accidents, or leaks.

You must be familiar with, and have in your possession while driving, the

- shipping papers,
- written emergency instructions,
- written route plan,
- a copy of FMCSR part 397.

A driver transporting chlorine in cargo tanks must have an approved gas mask in the vehicle. The driver must also have an emergency kit for controlling leaks in dome cover plate fittings on the cargo tank.

Stop before crossing a railroad if your vehicle:

- is placarded, or
- carries any amount of chlorine, or
- has cargo tanks, whether loaded or empty, used for hazardous materials.

You must stop 15 to 50 feet before the nearest rail. Proceed only when you are sure no train is coming. Don't shift gears while crossing the tracks.

## ***Papers for Class A or B Explosives***

## ***Equipment for Chlorine***

## ***Stop Before Railroad Crossings***

No Smoking  
Warn Others  
Keep People Away  
Avoid Contact or Inhaling

## **7.7 Hazardous Materials -- Emergencies**

The Department of Transportation has a guidebook for fire fighters, police, and industry personnel. The guidebook tells them what to do first to protect themselves and the public from hazardous materials. The guide is indexed by shipping name and hazardous material ID number. Emergency personnel look for these things on the shipping paper. That is why it is vital that the shipping name, ID number, label, and placards are correct.

As a professional driver, your job at the scene of an accident is to

- Keep people away from the area.
- Limit the spread of material, **only if you can safely do so.**
- Communicate the danger to emergency response personnel.

## ***Emergency Response Guidebook***

## ***Accidents / Incidents***

Follow this checklist.

1. Check to see that your driving partner is OK.
2. Keep shipping papers with you.
3. Keep people far away & upwind.
4. Warn others of the danger.
5. Send for help.
6. Follow your employer's instructions.

#### • Fires

You might have to control minor truck fires on the road. **However, unless you have the training and equipment to do so safely, don't fight hazardous material fires.** Dealing with hazardous material fires requires special training and protective gear.

When you discover a fire, send someone for help. You may use the fire extinguisher to keep minor truck fires from spreading to cargo before fire fighters arrive. Feel trailer doors to see if they are hot before opening them. If hot, you may have a cargo fire and should not open the doors. Opening doors lets air in and may make the fire flare up. Without air, many fires only smolder until firemen arrive, doing less damage. If your cargo is already on fire, it is not safe to fight the fire. Keep the shipping papers with you to give to emergency personnel as soon as they arrive. **Warn other people of the danger and keep them away.**

#### • Leaks

If you discover a cargo leak, identify the material by using shipping papers, labels, or package location. **Do not touch any leaking material.** Many people, under the stress of handling an accident or leak, forget and injure themselves this way. Do not try to identify material or find the source of a leak by smell. Many toxic gases destroy one's sense of smell. They can injure or kill you even if they don't smell. Do not eat, drink, or smoke around a leak or spill.

If hazardous material is spilling from your vehicle, do not move it any more than safety requires. You may move off the road and away from places where people gather, if doing so serves safety. Only move your vehicle if you can do so without danger to yourself or others.

Never continue driving with hazardous material leaking from your vehicle to find a phone booth, truck stop, help, or similar reason. Remember that the carrier pays for the cleanup of contaminated parking lots, roadways, and drainage ditches. The costs are enormous, so don't leave a lengthy trail of contamination. If hazardous material is spilling from your vehicle,

- Park it.
- Secure the area.
- Stay there.
- Send someone else for help.

When sending someone for help, give that person:

- a description of the emergency,
- your exact location and direction of travel,
- your name, the carrier's name, and the name of the community or city where your terminal is located
- the shipping name, hazard class, and ID number of the material, if you know them.

This is a lot for someone to remember. It is a good idea to write it all down for the person you send for help. The emergency response team must know these things to find you and to handle the emergency. They may have to travel miles to get to you. This information will help them to bring the right equipment the first time, without having to go back for it.

Never move your vehicle if doing so will cause contamination or damage the vehicle. Keep downwind and away from roadside rests, truckstops, cafes, businesses. Never try to repack leaking containers. Unless you have the training and equipment to repair leaks safely, don't try it. Call your dispatcher or supervisor for instructions, and, if needed, emergency personnel.

**Explosives.** If your vehicle breaks down or is in an accident while carrying explosives, warn others of the danger. Keep bystanders away. Do not allow smoking or open fire near the vehicle.

### ***Response to Specific Hazards***

Remove all explosives before pulling apart vehicles involved in a collision. Place the explosives at least 200 feet from the vehicles and occupied buildings. If there is a fire, warn everyone of the danger of explosion. Stay a safe distance away.

**Flammable liquids.** If you are transporting a flammable liquid and have an accident or your vehicle breaks down, prevent bystanders from gathering. Warn people of the danger. Keep them from smoking.

Never transport a leaking cargo tank farther than needed to reach a safe place. If safe to do so, get off the roadway. Don't transfer flammable liquid from one vehicle to another on a public roadway except in emergency.

**Flammable Solids and Oxidizing Materials.** If a flammable solid or oxidizing material spills, warn others of the fire hazard. Do not open smoldering packages of flammable solids. Remove them from the vehicle if you can safely do so. Gather and remove any broken packages if safe to do so. Also remove unbroken packages if it will decrease the fire hazard.

**Corrosive Materials.** If corrosives spill or leak in transit, be careful to avoid further damage or injury when handling the containers. Parts of the vehicle exposed to a corrosive liquid must be thoroughly washed with water. Wash out the interior as soon after unloading as possible, before reloading the vehicle.

If further transportation of a leaking tank would be unsafe, get off the road. If safe to do so, try to contain any liquid leaking from the vehicle. Keep spectators away from the liquid and its fumes. Do everything possible to prevent injury to other highway users.

**Compressed Gases.** If compressed gas is leaking from your vehicle, warn others of the danger. Only permit those involved in removing the hazard or wreckage to get close. You must notify the shipper of the compressed gas of any accident.

Unless you are fueling machinery used in road construction or maintenance, do not transfer a flammable compressed gas from one tank to another on any public roadway.

**Poisons.** You must protect yourself, other people, and property from harm. Remember that many products classed as poison are also flammable. If you think a leaking poison liquid or gas might be flammable, take the added precautions needed for flammable liquids or gases. Do not allow smoking, open flame, or welding. Warn others of the hazards of fire, of inhaling vapors, or coming in contact with the poison.

A vehicle involved in a leak of Poison A or Poison B must be checked for stray poison before being used again.

**Radioactive Materials.** If a leak or broken package involves radioactive material, tell your dispatcher or supervisor as soon as possible. If there is a spill, or if an internal container might be damaged, do not touch or inhale the material. Do not use the vehicle until it is cleaned and checked with a survey meter.

• **Required Notifications**

The National Response Center helps coordinate emergency response to chemical hazards. They are a resource to the local police and fire fighters. The person in charge of a vehicle involved in an accident may have to phone the National Response Center. This call will be in addition to any made to police or fire fighters. You or your employer must phone when **any** of the following occur **as a direct result of a hazardous materials incident**.

- a person is killed,
- a person receives injuries requiring hospitalization,
- estimated carrier or other property damage exceeds \$50,000.

National Response Center  
(800) 424 - 8802

The person making the immediate telephone report should be ready to give:

- Their name;
- Name and address of the carrier they work for;
- Phone number where they can be reached;
- Date, time, and location of incident;
- The extent of injuries, if any;
- Classification, name, and quantity of hazardous materials involved, if such information is available;
- Type of incident and nature of hazardous material involvement and whether a continuing danger to life exists at the scene.
- If a reportable quantity of hazardous substance was involved, the caller should give:
  - The name of the shipper,
  - The quantity of the hazardous substance discharged.

Be prepared to give your employer the required information. Carriers must make detailed written reports within 15 days.

The Chemical Transportation Emergency Center (CHEMTREC) in Washington also has a 24 hr. toll free line. CHEMTREC was created to provide emergency personnel with technical information about the physical properties of hazardous products. The National Response Center and CHEMTREC are in close communication. If you call either one, they will tell the other about the problem when appropriate.

CHEMTREC  
(800) 424 - 9300

### Test Your Knowledge

1. If your placarded trailer has dual tires, how often should you check the tires?
2. What is a safe haven?
3. How close to the travelled part of the roadway can you park with Explosives B?
4. How close can you park to a bridge, tunnel, or building with the same load?
5. What type of fire extinguisher must placarded vehicles carry?
6. You're hauling 100 lbs of **flammable solid - dangerous when wet** material. Do you need to stop before railroad crossings?
7. At a rest area you discover your hazardous material shipment slowly leaking from the vehicle. There's no phone around. What should you do?
8. What is the Emergency Response Guidebook?

These questions may be on your test. If you can't answer all, reread Sections 7.6 and 7.7.

(Note: You will not be tested on the numbers in this table.)

### **Appendix A** **Radioactive Separation Table**

Do not leave radioactive yellow - II or yellow - III labeled packages near people, animals, or film longer than shown in this table.

total transport index	minimum distance in feet					to people or cargo compartment partitions
	to nearest undeveloped film					
	0 - 2 hours	2 - 4 hours	4 - 8 hours	8 - 12 hours	over 12 hours	
None	0	0	0	0	0	0
0.1 to 1.0	1	2	3	4	5	1
1.1 to 5.0	3	4	6	8	11	2
5.1 to 10.0	4	6	9	11	15	3
10.1 to 20.0	5	8	12	16	22	4
20.1 to 30.0	7	10	15	20	29	5
30.1 to 40.0	8	11	17	22	33	6
40.1 to 50.0	9	12	19	24	36	7

(Note: You will not be tested on this Table.)

### **Appendix B:** **Table of Hazard Class** **Definitions**

HAZARD CLASS	DEFINITION	EXAMPLES
<b>Flammable liquid</b>	Any liquid having a flash point below 100°F as determined by tests listed in 173.115(d). Exceptions are listed in 173.115(a).	Ethyl alcohol, gasoline, acetone, benzene, dimethyl sulfide
<b>Combustible liquid</b>	Any liquid having a flash point at or above 100° and below 200°F as determined by tests listed in 173.115(d). Exceptions are listed in 173.115(b).	Kerosine, fuel oil
<b>Flammable solid</b>	Any solid material, other than an explosive, liable to cause fires through friction or retained heat from manufacturing or processing, or which can be ignited readily creating a serious transportation hazard because it burns vigorously and persistently.	Nitrocellulose (film), phosphorus, charcoal

HAZARD CLASS	DEFINITION	EXAMPLES
<b>Oxidizer</b>	A substance such as chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily to stimulate the combustion of organic matter.	Potassium bromate, hydrogen peroxide solution, chromic acid, some bleaches
<b>Organic peroxide</b>	An organic compound containing the bivalent -O-O- structure and which may be considered a derivative of hydrogen peroxide where one or more of the hydrogen atoms have been replaced by organic radicals. Exceptions are listed in 173.151a.	Urea peroxide, benzoyl peroxide
<b>Corrosive Material</b>	Liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact. Liquids that severely corrode steel are included.	Bromine, soda lime, hydrochloric acid, sodium hydroxide solution, battery acid
<b>Flammable gas</b>	A compressed gas, as defined in 173.300(a), that meets certain flammability requirements.	Butane, engine starting fluid, hydrogen, liquefied petroleum gas
<b>Nonflammable gas</b>	A compressed gas other than a flammable gas.	Chlorine, anhydrous ammonia, oxygen
<b>Irritating material</b>	A liquid or solid substance which on contact with fire or when exposed to air gives off dangerous or intensely irritating fumes. Poison A materials excluded.	Tear gas, monochloroacetone, diphenylchlorarsine
<b>Poison A</b>	Extremely dangerous poison gases or liquids belong to this class. Very small amounts of these gases or vapors of these liquids, mixed with air, are dangerous to life.	Hydrocyanic acid, bromoacetone, nitric oxide, phosgene, Nitrogen tetroxide, Ethyldichlorarsine
<b>Poison B</b>	Substances, liquids, or solids (including pastes and semi-solids), other than Poison A or irritating materials, that are known to be toxic to humans. These materials cause serious sickness or death within 48 hours following skin contact, inhalation, or ingestion by mouth. In the absence of adequate data on human toxicity, materials are presumed to be toxic to humans if they are toxic to laboratory animals exposed under specified conditions.	Phenol, nitroaniline, parathion, cyanide, mercury based pesticides, disinfectants
<b>Etiologic agents</b>	A viable micro-organism, or its toxin, which causes or may cause human disease.	Vibrio cholerae, clostridium botulinum, polio virus, salmonella, all serotypes
<b>Radioactive material</b>	A material that spontaneously emits ionizing radiation having a specific activity greater than 0.002 microcuries per gram. Further classifications are made within this category according to levels of radioactivity.  Explosives are chemical compounds, mixtures, or devices, the primary or common purpose of which is to function by explosion, unless such compound, mixture, or device is otherwise classified. Explosives are divided into three subclasses:	Thorium nitrate, uranium hexafluoride
<b>Explosives A</b>	Detonate with a shock wave greater than the speed of sound and are of maximum hazard.	Dynamite, Nitroglycerin
<b>Explosives B</b>	Generally function by rapid combustion rather than detonation and are a flammable hazard.	Torpedo, propellant explosive
<b>Explosives C</b>	Manufactured articles, such as small arm ammunition, that contain restricted quantities of Class A and/or Class B explosives, and certain types of fireworks. Class C explosives are of minimum hazard.	Toy caps, trick matches, signal flare, some fireworks
<b>Blasting agent</b>	A material designed for blasting, but so insensitive that there is very little probability of ignition during transport.  ORM (Other Regulated Materials) is any regulated material that does not meet the definition of the other hazard classes. ORM are divided into five subcategories:	Ammonium nitrate - fuel oil mixture
<b>ORM-A</b>	A material which has an anesthetic, irritating, noxious, toxic, or similar property and can cause extreme annoyance or discomfort to passengers and crew in the event of leakage during transportation.	Trichloroethylene, carbon tetrachloride, ethylene dibromide, chloroform
<b>ORM-B</b>	A material capable of causing significant damage to a transport vehicle or vessel if leaked. This class includes materials that may be corrosive to aluminum.	Calcium oxide, ferric chloride, potassium flouride
<b>ORM-C</b>	A material which has other inherent characteristics not described as an ORM-A or ORM-B, but which make it unsuitable for shipment unless properly identified and prepared for transportation. Each ORM-C material is specifically named in the Hazardous Materials Table.	Castor beans, cotton, asbestos

**HAZARD CLASS****DEFINITION****EXAMPLES**

<b>ORM-D</b>	A material such as a consumer commodity which, although otherwise subject to regulation, presents a limited hazard during transportation due to its form, quantity, and packaging.
<b>ORM-E</b>	A material that is not included in any other hazard class, but is subject to regulation. Materials in this class include hazardous wastes and hazardous substances named in the List of Hazardous Substances and Reportable Quantities but not in the Hazardous Materials Table.

Consumer commodity not otherwise specified, such as nail polish, small arms ammunition, hair spray

Phenacetin, Saccharin, Aldicarb, reserpine, heptachlor

(Note: You will not be tested on the glossary.)

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**Hazardous Materials  
Glossary**

**Bulk packaging** - a packaging, including a transport vehicle or freight container, with a capacity greater than:

- 118.9 gallons for a liquid, or
- 881.8 pounds for a solid, or
- water capacity greater than 1000 lbs for a gas.

**Carboy** -a bottle or rectangular container that holds from 5 to 15 gallons of liquid. Carboys are made of glass, plastic, or metal and are often cushioned in a wooden box.

**Cargo tank** -any bulk liquid or compressed gas packaging, whether or not permanently attached to any motor vehicle, which by reason of its size, construction, or attachment to a motor vehicle, is loaded or unloaded without being removed from the motor vehicle. Any packaging fabricated under specifications for cylinders is not a cargo tank.

**Carrier** -a person engaged in the transportation of passengers or property by land or water (as a common, contract, or private carrier) or by civil aircraft.

**Compressed Gas** -any material kept in a container with a pressure exceeding 40 p.s.i. at 70° F, or 104 p.s.i. at 130° F.

**Consignee** - the business or person to whom a shipment is delivered.

**Cryogenic liquid** - a refrigerated liquefied gas having a boiling point colder than -130°F.

**Cylinder** -a pressure vessel designed for pressures higher than 40 psi.

**EPA** -the U. S. Environmental Protection Agency

**Etiologic agents** -a living micro-organism, or its toxin, which causes or may cause human disease.

**FMCSR** -The Federal Motor Carrier Safety Regulations.

**Freight container** -a reusable container designed and constructed to permit being lifted with its contents intact and intended primarily for containment of packages (in unit form) during transportation.

**Gross weight** -the weight of the packaging plus the weight of its contents.

**Hazardous material** -any material that poses an unreasonable risk to health, safety and property during transportation. These materials are named by DOT in the Hazardous Materials Table.

**Limited quantity** -the maximum amount with specific placarding, labeling, and packaging exceptions, except for Poison B materials.

**Marking** -applying the descriptive name, instructions, cautions, weight, or specification marks required to be placed on outside containers of hazardous materials.

**Mixture** -a material containing more than one chemical compound or element.

**Name of contents** -the proper shipping name as specified in the Hazardous Materials Table or the Optional Table.

**N.O.S.** -not otherwise specified

**Outage** -the amount by which a packaging falls short of being full of liquid, usually expressed in percent by volume. The amount of outage required for liquids in cargo tanks depends on how much the material will expand with temperature change during transit. Different materials expand at different rates. Enough outage must be allowed so that the tank will still not be full at 130°F.

**Overpack** -an enclosure used by a single shipper to provide protection or easy use in handling of a package or to combine two or more packages. "Overpack" does not include a freight container.

**Portable tank** -any package (except a cylinder having a 1000 lb or less water capacity) with capacity greater than 110 U.S. gallons designed primarily to be loaded in, on, or temporarily attached to, a transport vehicle. A portable tank is equipped with skids, mounting, or accessories to facilitate handling of the tank by mechanical means.

**Proper shipping name** -the name of the hazardous material shown in Roman print (not italics) in the Hazardous Materials Table.

**P.s.i.** -pounds per square inch.

**P.s.i.a.** -pounds per square inch absolute.

**Reportable quantity (RQ)** -the quantity (per single package) which equals or exceeds the quantity specified in column 3 of the List of Hazardous Substances and Reportable Quantities. Reportable quantities are treated as hazardous materials and have reporting requirements.

**Shipper's certification** - a statement on a shipping paper, signed by the shipper, saying he/she prepared the shipment properly according to law.

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation."

or

"I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by \* according to applicable international and national governmental regulations."

\* words may be inserted here to indicate mode of transportation (rail, aircraft, motor vehicle, vessel)



**Shipping paper** -a shipping order, bill of lading, manifest or other shipping document serving a similar purpose and containing the information required by the regulations.

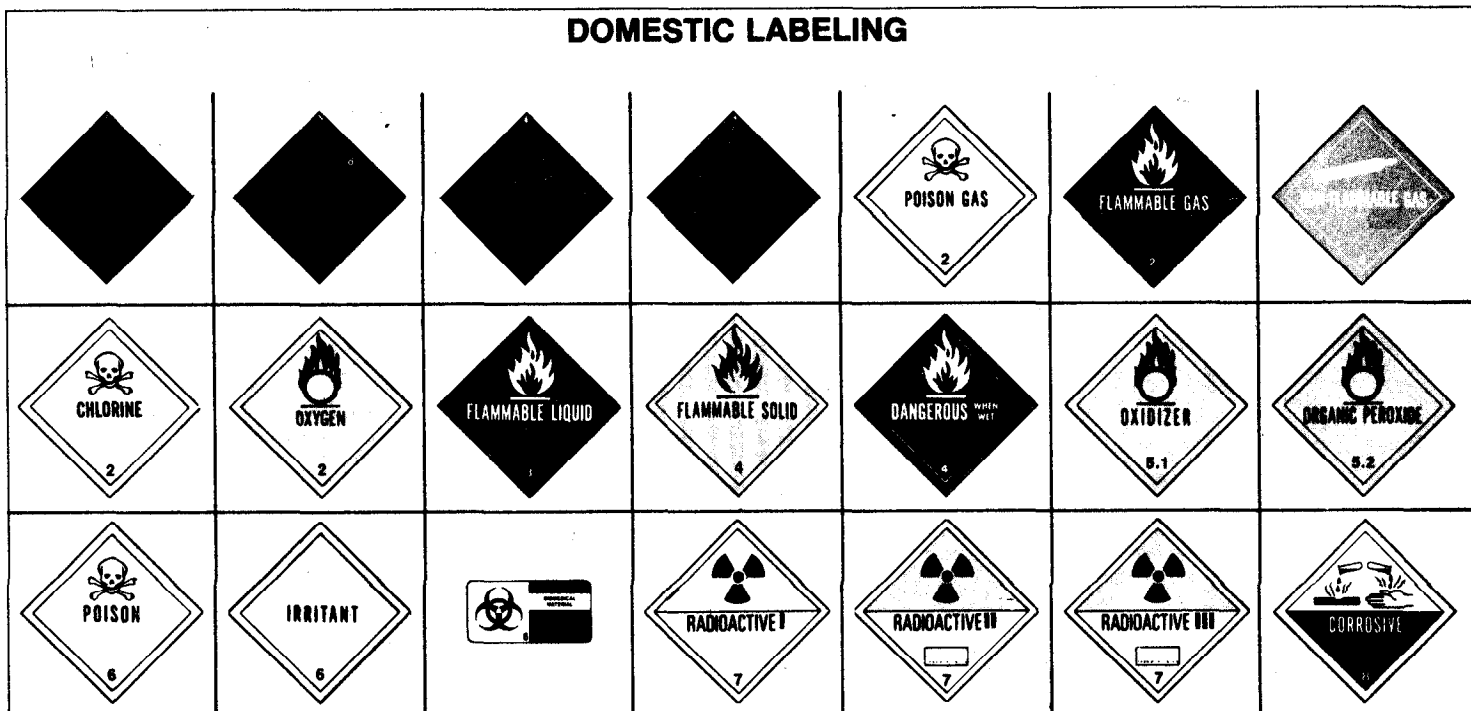
**Technical name** -a recognized chemical name currently used in scientific and technical handbooks.

**Transport Vehicle** -a cargo carrying vehicle such as an automobile, van, tractor, truck, semitrailer, tank car or rail car used for the transportation of cargo by any mode. Each cargo carrying body (trailer, rail car, etc.) is a separate transport vehicle.

**Water reactive material (solid)** -any solid material (including sludges and pastes) which when mixed with water, is likely to ignite or give off flammable or toxic gases in dangerous quantities. Water reactive material must have DANGEROUS WHEN WET and FLAMMABLE SOLID labels.

# Hazardous Materials Warning Labels

## DOMESTIC LABELING



## General Guidelines on Use of Labels

(CFR, Title 49, Transportation, Parts 100-177)

- Labels illustrated above are normally for *domestic shipments*. However, some air carriers may require the use of International Civil Aviation Organization (ICAO) labels.
- Domestic Warning Labels may display UN Class Number, Division Number (and Compatibility Group for Explosives only) [Sec. 172.407(g)].
- Any person who offers a hazardous material for transportation **MUST** label the package, if required [Sec. 172.400(a)].
- The Hazardous Materials Tables, Sec. 172.101 and 172.102, identify the proper label(s) for the hazardous materials listed.

- Label(s), when required, must be printed on or affixed to the surface of the package near the proper shipping name [Sec. 172.406(a)].
- When two or more different labels are required, display them next to each other [Sec. 172.406(c)].
- Labels may be affixed to packages (even when not required by regulations) provided each label represents a hazard of the material in the package [Sec. 172.401].

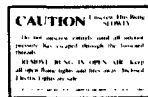
**Check the Appropriate Regulations  
Domestic or International Shipment**

## Additional Markings and Labels

### HANDLING LABELS



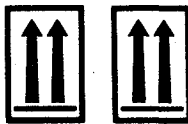
Cargo Aircraft Only  
172.402(b)



Bung Label  
172.402(e)



172.316

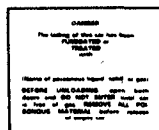


172.312(a)(c)

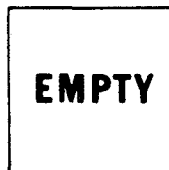
Package  
Orientation  
Markings



173.25(a)(4)



Fumigation  
173.9



173.427

Here are a few additional markings and labels pertaining to the transport of hazardous materials. The section number shown with each item refers to the appropriate section in the HMR. The Hazardous Materials Tables, Section 172.101 and 172.102, identify the proper shipping name, hazard class, identification number, required label(s) and packaging sections.

## Poisonous Materials



172.505



172.301

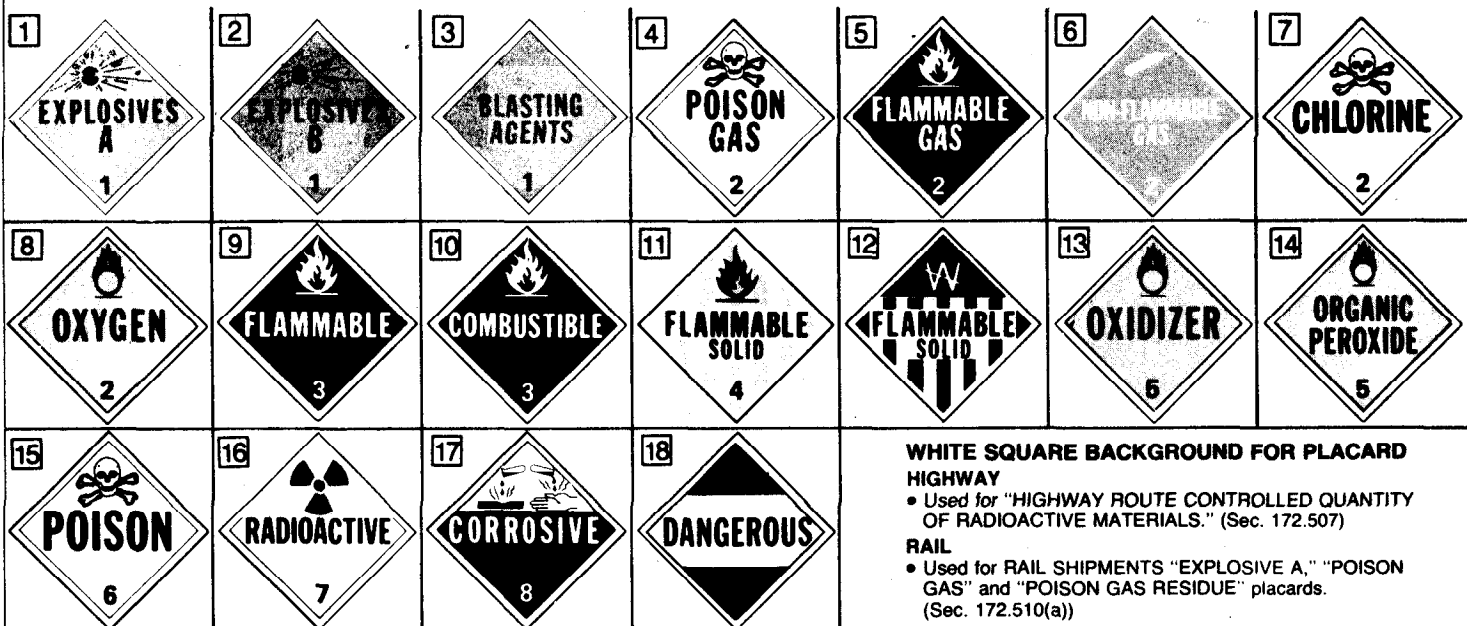
Materials which meet the inhalation toxicity criteria specified in Section 173.3a(b)(2), have additional "communication standards" prescribed by the HMR. First, the words "Poison-Inhalation Hazard" must be entered on the shipping paper, as required by Section 172.203(k)(4), for any primary capacity units with a capacity greater than one liter. Second, packages of 110 gallons or less capacity must be marked "Inhalation Hazard" in accordance with Section 172.301(a). Lastly, transport vehicles, freight containers and portable tanks subject to the shipping paper requirements contained in Section 172.203(k)(4) must be placarded with POISON placards in addition to the placards required by Section 172.504. For additional information and exceptions to these communication requirements, see the referenced sections in the HMR.

**Keep a copy of the DOT Emergency Response Guidebook handy!**

# Hazardous Materials Warning Placards

## DOMESTIC PLACARDING

Illustration numbers in each square refer to Tables 1 and 2 below.



### Guidelines

(CFR, Title 49, Transportation, Parts 100-177)

- Placard any transport vehicle, freight container, or rail car containing any quantity of material listed in Table 1.
- Materials which are shipped in portable tanks, cargo tanks, or tank cars must be placarded when they contain any quantity of Table 1 and/or Table 2 material.
- Motor vehicles or freight containers containing packages which are subject to the "Poison-Inhalation Hazard" shipping paper description of Section 172.203(k)(4), must be placarded POISON in addition to the placards required by Section 172.504 (see Section 172.505).
- When the gross weight of all hazardous material covered in TABLE 2 is less than 1000 pounds, no placard is required on a transport vehicle or freight container.
- Placard freight containers 640 cubic feet or more containing any quantity of hazardous material classes listed in TABLES 1 and/or 2 when offered for transportation by air or water (see Section 172.512(a)). Under 640 cubic feet see Section 172.512(b).

TABLE 1

Hazard Classes	No.
Class A explosives	1
Class B explosives	2
Poison A	4
Flammable solid (DANGEROUS WHEN WET label only)	12
Radioactive material (YELLOW III label)	16
Radioactive material: Uranium hexafluoride fissile (Containing more than 1.0% U235)	16 & 17
Uranium hexafluoride, low-specific activity (Containing 1.0% or less U235)	16 & 17

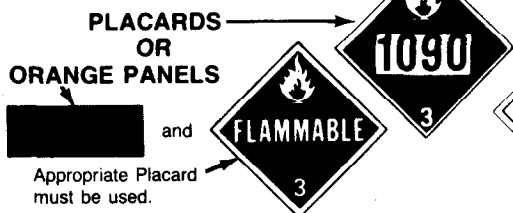
Note: For details on the use of Tables 1 and 2, see Sec. 172.504 (see footnotes at bottom of tables.)

TABLE 2

Hazard Classes	No.
Class C explosives	18
Blasting agent	3
Nonflammable gas	6
Nonflammable gas (Chlorine)	7
Nonflammable gas (Fluorine)	15
Nonflammable gas (Oxygen, cryogenic liquid)	8
Flammable gas	5
Combustible liquid	10
Flammable liquid	9
Flammable solid	11
Oxidizer	13
Organic peroxide	14
Poison B	15
Corrosive material	17
Irritating material	18

### UN or NA Identification Numbers

MUST BE DISPLAYED ON TANK CARS, CARGO TANKS, PORTABLE TANKS AND BULK PACKAGINGS



- When hazardous materials are transported in Tank Cars (Section 172.330), Cargo Tanks (Section 172.328), Portable Tanks (Section 172.326) or Bulk Packagings (Section 172.331), UN or NA numbers must be displayed on placards, orange panels or, when authorized, plain white square-on-point configuration.
- UN (United Nations) or NA (North American) numbers are found in the Hazardous Materials Tables, Sections 172.101 and 172.102.
- Identification numbers may not be displayed on "POISON GAS," "RADIOACTIVE," or "EXPLOSIVE A," "EXPLOSIVE B," "BLASTING AGENTS," or "DANGEROUS" placards. (See Section 172.334.)
- In lieu of the orange panel, identification numbers may be placed on plain white square-on-point configuration when there is no placard specified for the hazard class (e.g., ORM-A, B, C, D, or E) or where the identification number may not be displayed on the placard. See Section 172.336(b) for additional provisions and specifications.
- When the identification number is displayed on a placard the UN hazard class number must be displayed in the lower corner of each placard (see Section 172.332 (c)(3)).
- Specifications of size and color of the Orange Panel can be found in Section 172.332(b).
- NA numbers are used only in the USA and Canada.

### Additional Placarding Guidelines



A transport vehicle or freight container containing two or more classes of material requiring different placards specified in Table 2 may be placarded DANGEROUS in place of the separate placards specified for each of those classes of material specified in Table 2. However, when 5000 pounds or more of one class of material is loaded therein at one loading facility, the placard specified for that class must be applied. This exception, provided in Section 172.504(b), does not apply to portable tanks, tank cars, or cargo tanks.

**CAUTION:** Check each shipment for compliance with the appropriate hazardous materials regulations — Proper Classification, Packaging, Marking, Labeling, Placarding, Documentation — prior to offering for shipment.

**In an emergency, call Chemtrec, 1-800-424-9300**